# Agricultural Rockshaft Bearing Block Structure and Wear Inserts Therefor

## Field of the Invention

**[0001]** The present invention relates generally to bearing block assemblies for large rotating tubular members such as agricultural implement rockshafts and, more specifically, to wear insert structure for such assemblies.

## Background of the Invention

**[0002]** Round steel rockshafts of tubular or solid cross section are commonly utilized to control height on implement frames and disk gang attachments. Bearing block assemblies typically support the shaft from a frame, and a hydraulic cylinder applies a turning moment which causes the rockshaft to rotate and raise and lower the frame or gang. The bearing block assemblies usually include a two-piece cast iron or welded steel bearing block which allow rotation about an axis but limit movement in the direction of the axis. As the rockshaft rotates, often under very heavy loading, wear occurs between the steel rockshaft and the metallic bearing block. Although the bearing blocks often include a grease fitting for lubrication to reduce the wear, the hostile operating environment results in contamination of the lubricant with dust and sand which accelerates the wear. To purge the contaminants from between the rockshaft and bearing block, frequent over-greasing is required to discharge the contaminants. This greasing process is often inconvenient because of the location of the assemblies in hard to reach areas and is time-consuming and messy.

**[0003]** A further problem inherent with most bearing block assemblies for large applications such as agricultural implement lift systems is one of manufacturing tolerances of the shafts and of the cast iron or welded steel bearing blocks. A loose or sloppy fit between the mating parts resulting from the tolerances, combined with excessive wear that is commonly encountered in the hostile operating environment, can result in functional problems for the lift systems.

## Summary of the Invention

**[0004]** It is therefore an object of the present invention to provide an improved bearing block structure which overcomes most or all of the aforementioned problems. It is another object of the present invention to provide such a structure which is particularly useful for lift systems on agricultural implements which operate

under heavy loads and in severe environmental conditions.

**[0005]** It is a further object of the present invention to provide an improved bearing block structure for an implement which has an increased wear life and which eliminates lubrication requirements. It is another object to provide such a structure which provides an improved fit between mating parts to reduce joint looseness.

**[0006]** It is yet another object of the present invention to provide an improved bearing block structure for the lift system of an implement or the like and insert structure therefor which is simple and inexpensive in construction and easy to assemble and repair. It is another object to provide insert structure which is easy to install and repair and which has improved wear characteristics.

**[0007]** In accordance with the above objects a bearing block structure is provided having a two-piece ultra high molecular weight (UHMW) polyethylene wear insert located between a cast iron or welded steel bearing block and a rockshaft. In one embodiment, identical insert halves are supported in corresponding insert cavities in the bearing block sections, and a small thin clip is secured between the sections to prevent relative rotation between the insert halves and the bearing block. In another embodiment, a stop member projects into the cavities to prevent rotation of the insert halves. The stop member may be an end wall of a cavity.

**[0008]** The bearing block structure is relatively inexpensive and easy to assemble and repair. The wear insert provides a low friction wear surface which eliminates need for frequent greasing of inconveniently located bearing areas and which has an extensive wear life, even in the hostile environment of a heavy agricultural tillage or planting implement.

**[0009]** These and other objects, features and advantages of the present invention will become apparent to one skilled in the art from the following description taken in view of the drawings.

## Brief Description of the Drawings

**[0010]** FIG. 1 is a side perspective view of a portion of an agricultural implement having a rockshaft supported by bearing block structure.

**[0011]** FIG. 2 is an enlarged side view of the bearing block structure shown in FIG.

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**[0012]** FIG. 3 is a perspective exploded view of the bearing block structure of FIG. 2.

**[0013]** FIG. 4 is a perspective exploded view similar to that of FIG. 3 but showing an alternate embodiment of the bearing block structure.

**[0014]** FIG. 5 is a perspective view of one section of the bearing block structure of FIG. 4 with an insert positioned in the cavity.

## Description of the Preferred Embodiment

**[0015]** Referring to FIG. 1, therein is shown a portion of an implement frame 10 including fore-and-aft extending upper tubular members 12 and 14 and transverse connecting tubular member 16, 18 and 20. An implement lift system is shown generally at 24 and includes first and second tubular rockshafts 30 and 32 supported from the transverse members 16 and 18 and connected for operation in unison by a linkage 36. A conventionally operated hydraulic cylinder (not shown) is connected between the frame 10 and a rockshaft arm 40 to rotate the rockshafts 30 and 32 about their transverse axes. As shown in FIG. 1, lift frame structure 44 is connected through rockshaft arms 50 and 52 to the rockshafts 30 and 32, respectively, to raise and lower the structure. Earthworking tools may be carried by the frame structure 44 for vertical adjustment relative to the implement frame 10 and the ground. The lift frame structure 44 is shown by way of example only and alternatively, a rockshaft may be connected to a conventional lift wheel assembly for raising and lowering the entire frame 10 relative to the ground.

**[0016]** The rockshafts 30 and 32 are rotatably supported from the frame 10 at several locations by bearing block structures indicated generally at 60. The bearing block structure 60 includes a first or bottom portion 62 (FIGS. 2 and 3) which abuts a supporting portion of the frame 10 and a second or top portion 64 secured relative to the first portion 62 by a pair of connection bolts 66 which pass through aligned bores 68 and 70 and through the supporting portion. Insert anti-rotation or clip structure 74 is sandwiched between the portions 62 and 64 as the bolts 66 are tightened in the

supporting portion. As best seen in FIG. 2, the portions 62 and 64 when assembled against the clip structure 74 define a circular rockshaft-shaft receiving opening 78. Wear insert structure 80 is supported within cavities 82 and 84 and projects radially inwardly from the opening to provide a replaceable wear-resistant and low friction bearing surface for the rockshaft.

**[0017]** In the embodiments shown in FIGS. 2 and 3, the cavities 82 and 84 are arc-shaped and extend completely around the inner surface of the sections 62 and 64 so that the ends (82e and 84e) of the cavities are open. The open ends facilitate casting of the sections 62 and 64. However, it is highly desirable to prevent relative rotation between the wear insert structure 80 and the cavities 82 and 84 so that relative rotation only occurs between the rockshaft and the insert structure 80. The anti-rotation structures 74 provide this function by projecting radially inwardly over the ends 82e and 84e. The structures 74 include radially inwardmost edges (74e) which are straight and extend generally parallel to the axis of the rockshaft supported by the bearing block structures 60. The structures 74 are apertured at 86 to align with the bores 68 and 70 to receive the mounting bolts 66. Indexing structure 90 prevents the structures 74 from rotating from the position shown with the edges 74e generally lying along the boundary of the opening 78 in the bearing block structure 60.

**[0018]** The edges 74e preferably are supported radially outwardly of the inside surfaces of the wear insert structure 80 (see FIG. 2) to prevent contact of the structures 74 with the rockshaft. However, an edge (see 74e' in FIG. 2) may be extended slightly radially inwardly beyond the surface of the bearing blocks to provide rockshaft contact with the clip prior to the insert being completely worn away so that the clip contacts the rockshaft to provide an audible wear warning. The indexing structure 90 assures that the structure 74 does not rotate about the axis of the bolt 66 and, as shown in FIGS. 2 and 3, includes a projection 92 cast into one of the sections 62 and 64 and received within an aperture 94 in the structure 74.

**[0019]** The insert structure 80 is preferably fabricated from ultra high molecular weight (UHMW) polyethylene and conforms generally to the shape of the corresponding cavities 82 and 84. The radially innermost surfaces of the structures

80 project inwardly from the edges of the cavities (FIG. 2) to prevent metal-to-metal contact between the rockshaft and the bearing block structure 60. To define a substantially circular opening when the insert structures 80 are assembled in the bearing block structure, each of the structures is slightly less than a complete semi-circle to accommodate the anti-rotation structure 74.

**[0020]** The split wear insert structure 80 simplifies assembly of the structure 80 in supportive relationship with the rockshaft. The structure 80 can be replaced when worn without completely dismantling the lift frame structure 44. By providing identical half-sections generally conforming to the surface of a half cylinder, the wear insert structure 80 is relatively easy and inexpensive to fabricate and reduces the number of components that have to be stocked.

**[0021]** It is to be understood that other structure may be utilized to provide contact areas and non-rotatably index the inserts relative to the bearing block structure. For example, in the embodiment shown in FIGS. 4 and 5, cavities 82' and 84' are close-ended. Ends 84e of the cavities abut the ends 80e of the insert structure 80 and define the anti-rotation structure to prevent turning of the inserts in the bearing blocks.

**[0022]** Having described the preferred embodiment, it will become apparent that various modifications can be made without departing from the scope of the invention as defined in the accompanying claims.